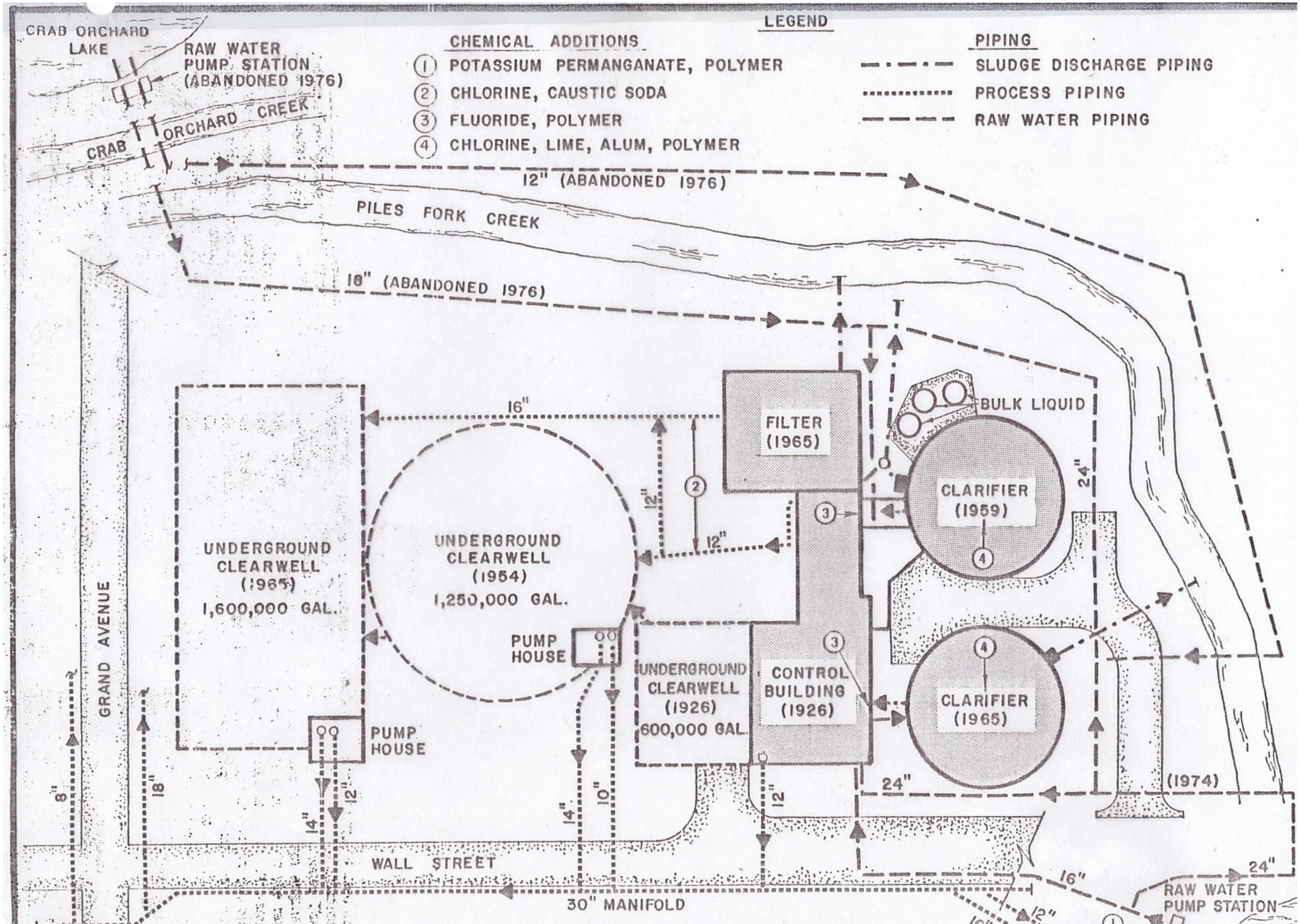


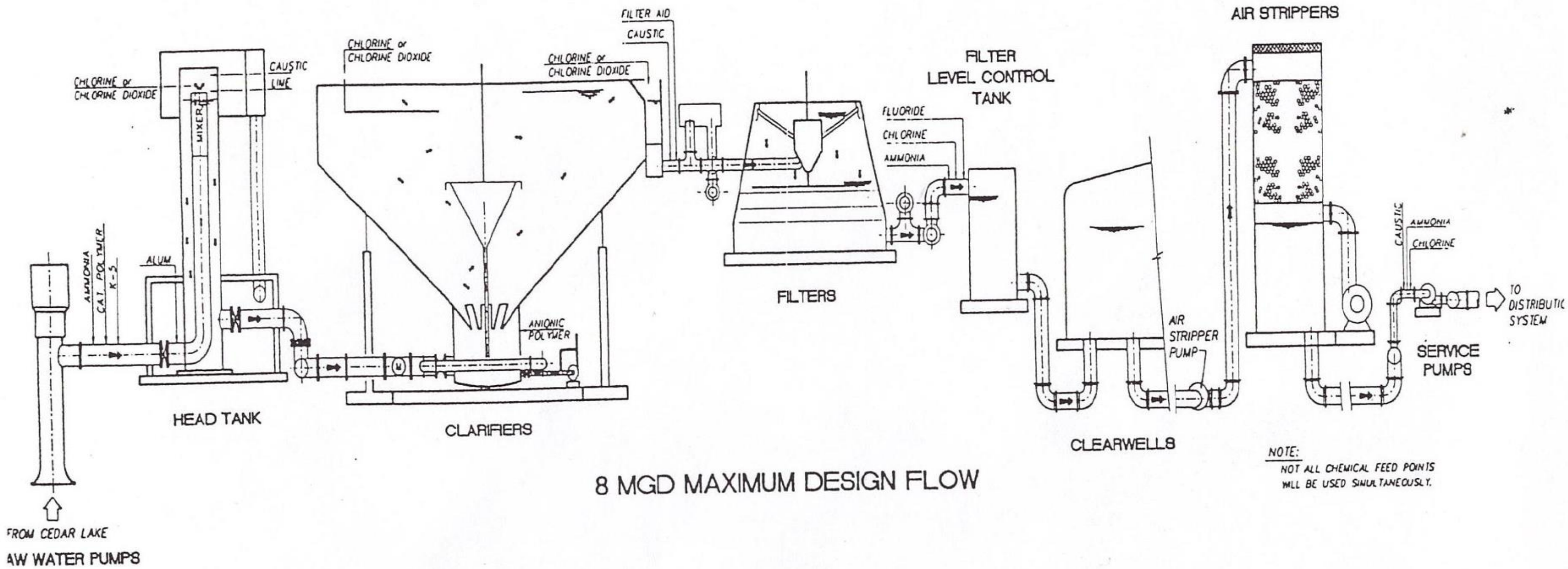
WATER TREATMENT PLANT PROCESS FLOW

DESIGN 8.0 M.G.D.

- Original Carbondale WTP on Wall Street 1926 treating deep well water
- After Crab Orchard Lake was constructed, it was used as source
- Switched from Crab Orchard Lake to Reservoir, but over time sedimentation in Reservoir required increasing chemicals and a new source was sought
- Cedar Lake was built in 1975 and remains as source today
- Original clear well was 0.6 MG
- 1.25 MG clear well added in 1954
- Original filters were in Control Building (not shown in diagram)
- Original pump house had 10” line with 14” line added after clear well addition in 1954 as a 2.6 MGD high service pump was added
- Additional 4 MGD flocculator/clarifier added in 1959
- Original clarifier replaced with another 4 MGD flocculator/clarifier in 1965
- Major renovation in 1965 added 1.6 MG clear well and filter gallery bringing capacity to 8 MGD
- Original switch to Cedar Lake pumped water to City Reservoir and had gravity flow to plant
- Sedimentation problems re-emerged an additional pumps and bypass for direct flow in 1977
- Complete redesign in early 90’s allowed state-of-the art facility to be commissioned in 1993
- New plant sited to the west of City Reservoir
- Wall Street plant was allowed by IEPA to send both filter backwash and clarifier concentrated solids to Piles Fork Creek
- Current plant has lagoons for collection of solids, but a discharge waiver for supernatent was allowed to City Reservoir
- Faced with a proposed revocation of discharge waver due to years of solid deposition in City Reservoir, discharge was rerouted to sewer to Carbondale Southeast WWTP in 2016

CITY of CARBONDALE, ILLINOIS

WATER PURIFICATION PROCESS DESIGN



8 MGD MAXIMUM DESIGN FLOW

RAW WATER PUMPS

PUMPS:

NO. 1 (EXIST.)	3.6 MGD
NO. 2 (EXIST.)	5.3 MGD
NO. 3 (EXIST.)	6.0 MGD
EMERGENCY (NEW)	4.0 MGD

HEAD TANK

HEIGHT	42.8 FT
DIAMETER	8 FT.
OPERATING VOLUME	13,300 GAL
RETENTION	2.4 MIN
DOWNFLOW VELOCITY	0.27 FT/SEC

51.5 FT. CLARIFIERS w/ EXTENDED UPPER SHELLS, DUAL INLETS, AND STATIC MIX BLADES (3 UNITS)

SURFACE AREA		2082 FT^2
SURFACE LOADING		0.88 GPM/FT^2
HEIGHT		38 FT.
VOLUME		278,000 GAL.
RETENTION		150 MIN.
RAPID MIX		2 MIN.
SLUDGE CONTACT		48 MIN.
CLARIFICATION		100 MIN.
MIN. DIAM. (CAN)		10.6 FT.
CAN AREA		86.5 FT^2
CAN RISE RATE		21.5 GPM/FT^2
INFLUENT VELOCITY DUAL INLETS: CONTROL INFINITELY ADJUSTABLE		VELOCITY HEAD:
LARGE 18"	2.28 FT/SEC.	0.08
SMALL 10"	7.40 FT/SEC.	0.84
BOTH	2.0 FT/SEC.	0.06
MIXING BLADES		8
HELICAL FLOW OUTLETS		6 (310 GPM EACH)

18 FT. CENTER FEED DECELERATING FLOW FILTERS (6 UNITS)

MAX. DIAM.	18 FT.
MAX. AREA	254 FT^2
LOADING	3.64 GPM/FT^2
SURFACE AREA	200 FT^2
HORIZ. VELOCITY @ WEIR	9 FT/SEC.
1 FT. FROM WEIR	6 FT/SEC.
FILTER MEDIA:	
0.45 MM SAND	2.5 FT.
1.00 MM ANTHRACITE	1.5 FT.
AVAILABLE HEADLOSS AT DESIGN FLOW	6–8 FT.
MAXIMUM WASH RATE	5100 GPM
	20 GPM/FT^2 - BOTTOM
	40 GPM/FT^2 - EXPANDED
	60 GPM/FT^2 - WEIR
WEIR FLOW	400 GPM/FT^2
WASH OVER WEIR	5"
AIR WASH	4 CFM/FT^2

FILTER LEVEL CONTROL TANK

DIAMETER	8 FT.
WEIR LENGTH	6 FT.
WEIR DEPTH	9 INCHES @ 8 MGD

CLEARWELL (2 UNITS)

DIAMETER	112 FT.
NOM. WATER DEPTH	14 FT.
VOLUME	1,000,000 GAL.
RETENTION AT MAX. DESIGN FLOW	3 HOURS

AIR STRIPPERS

(2 UNITS @ 4 MGD EA.)

DESIGN CHLOROFORM REMOVAL	80%
DESIGN WATER TEMP.	50%
DESIGN INFLUENT CHLOROFORM CONCENTRATION	0.15 mg/l

SERVICE AND FILTER BACKWASH PUMPS

SERVICE PUMPS:

QUANTITY	3
CAPACITY	4 MGD
TYPE	HORIZ. SPLIT-CASE CENTRIFUGAL PUMPS WITH VFDs

BACKWASH PUMPS:

QUANTITY	2
CAPACITY	5,100 GPM
TYPE	HORIZ. SPLIT-CASE CENTRIFUGAL PUMPS WITH VFD's